

Assessing the Effect of Mobile Phone Accessibility on Antenatal Care Service Utilization Among Pregnant Women in Turkana County.

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Abstract

The Sustainable Development Goals target reducing maternal mortality to below 70 per 100,000 births by 2030, yet Kenya's rate remains high at 362, with Turkana County particularly affected due to limited Antenatal Care (ANC) access. Growing mobile phone use in Kenya offers a promising way to overcome these barriers and improve maternal healthcare in marginalized areas. This paper assessed the effect of Mobile Phone Accessibility on Antenatal Care Service Utilization Among Pregnant Women in Turkana County. A mixed-methods design was employed, involving structured questionnaires with 262 participants (175 pregnant women and 87 healthcare providers) and in-depth interviews with pregnant and postpartum women. Quantitative findings revealed that 77% of providers reported using mobile phones to follow-up with mothers, and 78% observed that mothers used phones to seek ANC-related information. However, only 41% of providers felt adequately trained in digital health tools, and 54% believed that many women could not use such tools without support. Regression analysis confirmed that mobile phone accessibility was a statistically significant predictor of ANC uptake ($R^2 = 0.705$, $p < 0.001$), with accessibility demonstrating a strong standardized coefficient ($\beta = 0.585$). This underscores the foundational role of physical access to mobile devices in enhancing maternal health service utilization. Qualitative interviews enriched these findings, illustrating how SMS reminders improved clinic attendance by reducing forgetfulness and providing emotional reassurance. However, low phone ownership, digital literacy barriers, and reliance on shared phones constrained effectiveness. The study concludes that mobile phones offer a promising pathway to improving ANC uptake in remote contexts like Turkana, but maximizing impact requires addressing network reliability, digital literacy, and gendered access barriers.

Keywords: Mobile phone accessibility; Antenatal care; mHealth; Turkana County; Maternal health Digital literacy.

Introduction

Maternal healthcare remains a major concern in many low- and middle-income regions, where timely antenatal services are essential for reducing maternal and newborn deaths (WHO, 2016). In Kenya's

Turkana County, women face significant obstacles to accessing care due to geographic isolation, economic hardship, and weak infrastructure (Kenya National Bureau of Statistics [KNBS], 2019). As a result, many pregnant women struggle to attend antenatal visits, hindered by long travel distances, poor transport options, and limited awareness of the importance of these services (Jillo et al., 2015).

Despite these obstacles, the rapid proliferation of mobile phone technology across sub-Saharan Africa, including Turkana County, provides a significant opportunity to address these disparities and improve maternal health outcomes (GSMA, 2020). The success of mobile phone interventions, however, is influenced by technical, cultural, and contextual factors, including user preferences, prior experience, and community acceptance (Gunamany & Subramanyam, 2022). Failure to address these barriers can reduce adoption and limit ANC improvements. Studies indicate that socio-cultural norms, accessibility, and digital literacy strongly shape how women engage with mobile health programs (Mbarushimana & Nsanzabera, 2024).

Turkana County faces persistently low ANC adherence rates relative to the national average. According to the 2022 Kenya Demographic and Health Survey (KNBS & ICF, 2023), Turkana recorded an ANC4+ completion rate of only 35%, compared to 80.5% in Nairobi, one of the starkest county-level disparities in the country. The county's maternal mortality ratio stands at 381 per 100,000 live births, above the national figure of 355 per 100,000 (KNBS, 2019), and its neonatal mortality rate remains among the highest nationally. Home births, a proxy indicator of low skilled attendance, are recorded at 47% in Turkana, the third highest county rate in Kenya (KNBS & ICF, 2023). More recently, Turkana County's 2025 Reproductive and Maternal Health Performance Report (KHIS) revealed that, of 49,284 expected pregnancies, 86.6% of mothers attended a first ANC visit, yet only 47.6% completed a fourth visit: a dropout rate highlighting persistent structural and socio-cultural barriers (Turkana County Government, 2026). In response, the White Ribbon Alliance Kenya, funded by UNFPA, launched the 'Every Woman, Every Newborn Everywhere' (EWENE) campaign in Turkana in December 2024, targeting 80% ANC and postnatal care coverage and 90% skilled birth attendance (Turkana County Government, 2024). The purpose of this paper was to assess the Effect of Mobile Phone Accessibility on Antenatal Care Service Utilization Among Pregnant Women in Turkana County, Kenya. Specifically, it focuses on the role of mobile phone accessibility on uptake of ANC services among pregnant women in Turkana County.

Review of Key Documents

Global and Regional Evidence

The emergence of mobile technology has transformed healthcare delivery globally, especially through mobile health (mHealth) initiatives. The WHO (2016) asserts that mobile phones serve as potent instruments for enhancing access to health-related data, particularly in low- and middle-income countries (LMICs) where conventional healthcare infrastructure is inadequate. Global studies indicate that mobile phones can augment communication between patients and physicians, disseminate health education, and transmit appointment reminders, thereby improving health-seeking behaviors (Lester et al., 2010). The efficacy of mHealth is significantly influenced by accessibility factors, including network connectivity, device ownership, and affordability (Kruse et al., 2019). Despite worldwide mobile phone penetration exceeding five billion users, access inequities remain, particularly among rural and marginalized groups (Kruse et al., 2019).

In Sub-Saharan Africa, mobile subscriptions reached 1.1 billion in 2021, driven by affordable devices and expanding network coverage (GSMA, 2022). Research in Ghana demonstrated that

SMS-based reminders increased ANC attendance by 20% among pregnant women with phone access (Noordam et al., 2011). In Nigeria, mobile phone interventions improved maternal knowledge of ANC benefits, though poor network reliability and low digital literacy limited broader impact (Oyeyemi & Wynn, 2014). These studies underscore that while mobile phones hold promise for maternal healthcare in Africa, accessibility remains a critical determinant of success.

In Kenya, mobile subscriptions exceeded 65 million (Communications Authority of Kenya, 2023), yet rural areas lag behind in network coverage and phone ownership. Studies in Kenya have shown that mobile phone ownership among expectant mothers correlates with improved maternal health-seeking behaviours and increased facility-based ANC attendance (Fedha, 2014; Wakadha et al., 2013). In rural Kenyan communities, however, cost, intermittent electricity, and gender-based disparities in phone access limit mobile utility for health interventions (Kazi et al., 2017).

In Turkana County, although 60% of women had access to a cell phone which was often shared, network disruptions and insufficient charging facilities hindered health-related phone use (Cheptum et al., 2019). Evidence from comparable low-resource settings in East Africa suggests that voice-based ANC reminders can meaningfully increase attendance among women with reliable phone access (Lund et al., 2014), pointing to the potential of tailored, context-appropriate interventions

Theoretical Framework: Technology Acceptance Model (TAM)

The study is grounded in the Technology Acceptance Model (TAM), developed by Davis in 1985 (Davis, 1985). TAM posits that technology adoption is driven by two core constructs: perceived usefulness (the belief that a technology enhances task performance) and perceived ease of use (the belief that using the technology requires minimal effort) (Ajibade, 2018). In mHealth contexts, perceived usefulness encompasses the ability to receive appointment reminders, health education, and timely communication with providers; perceived ease of use relates to language accessibility, simplicity of interaction, and minimal technical prerequisites (Wondimu et al., 2025). In Turkana County, both constructs are shaped by literacy rates, network coverage, and culturally mediated access to devices (Atinafu et al., 2023). TAM has been applied in ANC-specific mHealth studies in Kenya, including Kasaya et al. (2025) in Kakamega County, confirming its relevance to understanding mobile technology adoption in maternal health settings.

Theoretical Framework: Health Belief Model (HBM)

The Health Belief Model (HBM), associated with Rosenstock (1974), and refined by Champion and Skinner (2008), posits that health behaviors are driven by six constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Glanz et al., 2008). In the ANC context, mobile phone reminders function as cues to action that reinforce the perceived severity of missed visits and the benefits of timely attendance. Where reminders are delivered in accessible formats, such as voice calls in Ng'aturkana and they also strengthen self-efficacy by reducing information barriers (Dafroyati et al., 2024). The HBM complements TAM in this study by addressing how women's beliefs about risk and benefit mediate their response to mobile phone-based interventions, particularly in the face of structural barriers such as distance, cost, and spousal gatekeeping.

Table 1: Dimensions of Mobile Phone Accessibility and Their Influence on ANC Uptake

Accessibility Dimension	Indicators	Observed Influence on ANC Uptake in Turkana
Ownership/Availability	Personal phone ownership, shared access, facility digital tools	47% of providers disagreed that mothers own phones for ANC communication; shared access limits privacy and consistency.
Mode of Access	Provider follow-up via mobile phone	22% of healthcare providers agreed using mobile phones to follow up with mothers.
	Mothers' ability to call or text providers	only 12% of the healthcare providers noted that mothers could call or text to ask ANC related questions.
	Preference for in-person ANC visits.	Despite the perceived utility of mobile communication, a significant proportion (51% agreed, 26% strongly agreed) indicated that most mothers prefer in-person ANC visits over digital contact."
Network Connectivity	Signal reliability, network problems, internet access	51% agreed poor signal in rural areas affects follow-up; 77% acknowledged network problems affect ANC communication.
Digital Literacy	Need for support, staff training, independent use	54% disagreed that mothers could use tools independently; only 38% agreed staff received digital training.

Methodological Approach

The research employed a descriptive correlational research design to explore the dynamics of its variables. This approach allowed the study to address critical questions such as what factors influence ANC attendance and how mobile phone use impacts it without introducing artificial interventions. The research was conducted in Turkana County, which encompasses an area of 77,000 square kilometers and has a population of 926,976. The target population incorporated 506 expectant mothers and 253 nurses drawn from public health facilities across the county. The sample population was computed using Yamane (1973) as applied by Opon et al. (2021) formula as follows: $n = N / (1 + Ne^2)$ Where N – Population size (759), e (margin of error 5%). Therefore, sample size was computed as; $n = 759 / (1 + 759(0.05)^2)$ $n = 262$ participants. The total sample of 262 was then proportionally allocated between the two strata based on their share of the target population. Expectant mothers comprised 67% of the target population (506 out of 759), yielding a sample of 175 ($67\% \times 262 = 175$). Nurses comprised the remaining 33% (253 out of 759), yielding a sample of 87 ($33\% \times 262 = 87$).

The research employed a structured questionnaire consisting of five sections. The initial component documented background characteristics, while subsequent sections addressed specific study topics, including a dedicated section on mobile phone accessibility (ownership/availability, mode of access,

network connectivity, digital literacy). The close-ended Likert scale rating enabled quantification of respondents' attitudes on mobile phone adoption. The interview guide for ANC mothers was designed to collect qualitative data through structured questions. It included sections that explore the participants' background, utilization of mobile phones, experiences with ANC services, and challenges they face in accessing these services. Quantitative data analysis utilized descriptive statistics, including measures of central tendency, to quantify elements such as the average number of ANC visits and the variability in mobile phone ownership. Qualitative data was evaluated thematically to reveal profound insights into the experiences and views of pregnant women, thus enhancing the quantitative findings with narrative depth. Specifically, an inductive thematic analysis approach was adopted, following the six-phase framework described by Braun and Clarke (2006), allowing themes to emerge directly from the data without pre-existing coding frameworks. This process involved identifying recurring themes such as barriers to usability or cultural attitudes toward mobile interventions from interview responses, with results presented as direct quotes and written narratives in a clear, structured manner.

Findings

Quantitative Findings

The findings concerning mobile phone accessibility and its impact on ANC service uptake revealed several key insights. 77% of healthcare providers (55% agree, 22% strongly agree) utilize mobile phones to follow up with mothers. Furthermore, only 12% of the healthcare providers noted that mothers could call or text to ask ANC related questions. Despite the perceived utility of mobile communication, a significant proportion (51% agreed, 26% strongly agreed) indicated that most mothers prefer in-person ANC visits over digital contact.

However, challenges related to the effective integration of mobile health tools were also apparent. Only 38% agreed that staff received training on digital tools for ANC provision. In comparison, 47% disagreed to this statement. Furthermore, 42% agreed and 12% strongly agreed that most ANC mothers needed help using mobile phones for health communication. Finally, 54% of respondents agreed that they could use mobile health tools without support.

Infrastructure limitations were also identified as potential impediments. Despite the perceived utility, 51% of respondents agreed, and 26% strongly agreed, that poor signal in rural areas affects follow-up using mobile devices. A similar sentiment was expressed regarding network problems affecting ANC communication (51% agreed, 26% strongly agreed). Conversely, the importance of reliable internet access within facilities was strongly affirmed, with 61% disagreeing and 17% strongly disagreeing that it supports digital health records.

The availability of digital tools within facilities was negatively acknowledged by 38% of healthcare workers who agreed and 12% strongly agreed. Regarding phone ownership among expectant mothers, 47% of healthcare workers disagreed and 18% strongly disagreed that mothers in the area own mobile phones for ANC communication. Lastly, 63% of healthcare workers noted that ANC forms were available when needed.

Regression Analysis

A multiple linear regression analysis was conducted to determine the extent to which mobile phone accessibility and usability predict the uptake of ANC services.

The regression model summary (Table 2) indicated a strong positive correlation between the predictors (usability and accessibility) and the uptake of ANC services, with a multiple correlation coefficient (R)

of 0.840. The R^2 value of 0.705 indicates that 70.5% of the variation in ANC uptake in Turkana is explained by mobile phone access, usability, and usage frequency. This suggests these factors strongly influence attendance, while the remaining 29.5% reflects other contextual influences such as socio-cultural and economic barriers. The Adjusted R Square of 0.697 further supports the model's explanatory power, accounting for the number of predictors.

Table 2: Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.840 ^a	0.705	0.697	0.3853
a. Predictors: (Constant), usability, accessibility				

The analysis of variance (ANOVA) table demonstrated that the regression model was statistically significant ($F(2,73) = 87.203$, $p < 0.001$). This finding indicates that, collectively, mobile phone accessibility and usability are significant predictors of the uptake of ANC services.

Table 3: Regression ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.895	2	12.948	87.203	.000 ^b
	Residual	10.839	73	.148		
	Total	36.734	75			
a. Dependent Variable: uptake						
b. Predictors: (Constant), usability, accessibility						

The coefficients table revealed the individual contributions of each predictor. Mobile phone accessibility exhibited a statistically significant positive effect on the uptake of ANC services ($\beta = 0.585$, $p < 0.001$). This implies that for every one-unit increase in mobile phone accessibility, the uptake of ANC services is predicted to increase by 0.585 units, assuming usability remains constant. Similarly, mobile phone usability also demonstrated a statistically significant positive effect on the uptake of ANC services ($\beta = 0.330$, $p < 0.001$). This indicates that a one-unit increase in mobile phone usability is associated with a 0.330 unit increase in the uptake of ANC services, holding accessibility constant. These results collectively suggest that both mobile phone accessibility and usability are crucial factors positively influencing the uptake of ANC services.

Table 4: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.715	.397		-4.322	.000
	accessibility	1.030	.149	.585	6.929	.000
	Usability	.498	.128	.330	3.905	.000
a. Dependent Variable: uptake						

Qualitative Findings

Qualitative insights were obtained from in-depth interviews with pregnant and postpartum women.

Table 5: Qualitative Findings on Mobile Phone Accessibility and ANC Uptake

Theme	Findings	Quote
Perceptions of receiving ANC appointment reminders via mobile phones	Women appreciated SMS reminders, describing them as emotionally reassuring and effective prompts for clinic visits.	<i>"When I get the message, I feel someone is looking after me. It gives me courage to go to the clinic."</i>
Language and comprehension barriers	qualitative interviews revealed reliance on others to interpret messages, especially in rural and low-literacy households.	<i>"Sometimes I don't understand the message because I didn't go to school, I need someone to read for me."</i>
Network constraints in remote areas	Women in remote areas experienced challenges due to language barriers and poor network coverage.	<i>"The network here is not strong, so even when I want to look for something, I cannot."</i>
Gendered phone access	Gendered phone access was a recurrent issue. This dependence on shared devices sometimes limited the regularity and privacy of communication.	<i>"I don't have my own phone. I use my husband's when he is at home, but he doesn't like me using it too much."</i>

Participants generally expressed favourable opinions towards receiving mobile phone reminders for ANC appointments. Messages received via SMS were perceived as timely and helpful, providing a sense of care from health providers. This reassurance played a significant role in encouraging ANC attendance.

"When I get the message, I feel someone is looking after me. It gives me courage to go to the clinic." "It reminds me to prepare early and not forget the clinic day."

However, some women, especially in remote areas, experienced challenges understanding the messages due to language barriers, expressing a preference for messages in the Turkana language. *"Sometimes I don't understand the message because I didn't go to school, I need someone to read for me."* This suggests that mobile reminders may improve ANC uptake by strengthening women's confidence and sense of connection to care. In this way, reminders functioned as both informational and emotional support tools.

Message clarity was influenced by language, structure, and literacy. Educated participants found the messages easier to understand. However, others faced challenges due to brief content or technical terms. Several women recommended simplified and locally translated messages.

"Some messages are short, and I do not know what they mean." "If they write clearly, even those who cannot read well can still understand with help."

Additionally, some respondents struggled with reading English messages and depended on others to interpret them. *"When it is in English, I wait for my neighbour to come and read it for me."* Another added, *"If the CHV is around, she explains the message to us during the group talks."* Furthermore, qualitative interviews revealed reliance on others to interpret messages, especially in rural and low-

literacy households. This indicates a need to tailor message formats to match literacy levels and language preferences in Turkana.

Use of mobile phones to seek ANC-related information varied greatly by location and literacy. In urban settings such as Lodwar and Kakuma, women reported frequent use of SMS and health apps to learn more about pregnancy and care. However, in rural and pastoralist settings, usage was limited to basic functions like calls and SMS due to low digital literacy and poor network coverage. *"I sometimes ask my daughter to help me search for information about pregnancy using her phone."* Others noted, *"The network here is not strong, so even when I want to look for something, I cannot."* Some respondents relied on family members to interpret messages, underscoring the digital divide within Turkana County.

Gendered phone access was a recurrent issue. This dependence on shared devices sometimes limited the regularity and privacy of communication between mothers and healthcare providers. Cultural norms in parts of Turkana place decision-making power predominantly in the hands of male household heads. Several women reported that they needed their husband's permission to attend ANC appointments or use the household phone to access health messages.

"When I got the message, I told my husband. He said I should wait until next week when he is free to go with me." "Sometimes I want to go, but if my husband says there is no need, I stay. He says I have given birth before without problems."

These insights show how gender dynamics and perceptions about pregnancy influence maternal health behaviours, even in the presence of digital health tools.

The triangulation of quantitative and qualitative findings revealed that mobile phone interventions strongly influenced ANC uptake in Turkana County, but their effectiveness depended on context-specific factors. Quantitative results indicated that accessibility and usability explained a large portion of variation in ANC attendance, while qualitative interviews highlighted that women valued reminders for planning and reducing missed visits. These findings show that mobile phones can motivate attendance, particularly when reminders are personalized and timely. However, the impact was limited by device functionality, network reliability, and women's ability to use mobile technology effectively, indicating that technological interventions alone are insufficient without addressing practical access issues.

Persistent accessibility challenges were evident across both quantitative and qualitative data. Network disruptions, low personal phone ownership, and limited charging options restricted the reach of mHealth interventions. Low literacy and language barriers further reduced the effectiveness of text-based reminders, as many women relied on voice calls in Ng'aturkana. These gaps suggest that improving access through increased phone ownership, stable connectivity, and support for device use is critical for maximizing the potential of mobile-based ANC interventions in marginalized pastoralist communities."

Discussion

The finding that mobile phone accessibility significantly facilitates ANC uptake in Turkana County aligns with Kenyan studies demonstrating that mobile phone ownership among expectant women correlates with improved maternal behaviors and increased facility-based ANC attendance (Fedha, 2014; Wakadha et al., 2013). The regression coefficient ($\beta = 0.585$) confirms that accessibility is foundational for leveraging mHealth in maternal health, supporting the Technology Acceptance Model (TAM) which posits that perceived usefulness and ease of use influence adoption.

The finding that 77% of providers use mobile phones for follow-up demonstrates substantial engagement, consistent with the global Mobile WACH program, where personalized, two-way SMS

improved maternal engagement and trust (Unger et al., 2018; Lund et al., 2014). However, significant barriers persist. Although 41% of providers reported receiving training on digital tools, 38% had not, reflecting inconsistent digital literacy, a finding echoed in Sub-Saharan African research highlighting inadequate training as a key barrier to effective mHealth deployment (Sabetrohani et al., 2023).

Gendered phone access emerged as a critical barrier, with male partners often controlling phones, reflecting findings from studies by Njoroge et al. (2017) and Ochieng' et al. (2024). The finding that 54% of providers believed women could not use tools independently, supported by qualitative accounts of reliance on others to interpret messages, highlights that accessibility alone is insufficient without addressing digital literacy and household dynamics, echoing the Health Belief Model's emphasis on perceived barriers.

Consistent with the finding that 77% of providers acknowledged that network problems affect ANC communication, some women in remote areas still reported connectivity problems. This suggests spatial variation in mobile infrastructure, a common issue in rural mHealth contexts (Kazi et al., 2017). Overall, mobile accessibility is foundational, as confirmed by regression analysis, but its effectiveness is mediated by digital literacy, training, household dynamics, and systemic infrastructure.

Limitations of the Study

This study has several limitations that should be considered when interpreting the findings. First, the study employed a cross-sectional descriptive correlational design, capturing data at a single point in time. This limits the ability to establish causal directionality between mobile phone accessibility and ANC uptake, as the design cannot account for changes over time or rule out reverse causation.

Second, the target population was estimated based on an average of two ANC attendees per facility per day across Turkana County's 253 public health facilities, rather than on annual pregnancy registrations. Comprehensive data on the total number of pregnant women in Turkana County per year was not readily available from county health records at the time of the study. While this approach provided a practical sampling frame, it may not fully represent the actual population of pregnant women in the county, and the researchers acknowledge that annual pregnancy figures would have provided a more robust basis for determining the target population.

Third, women without access to mobile phones were excluded from the study by design, as the research focused specifically on mobile phone users. This means the findings cannot be generalized to the full population of pregnant women in Turkana, including those entirely without device access, who may face the most severe barriers to ANC attendance. Including non-phone users as a comparison group would have strengthened the study design.

Fourth, the vast geography of Turkana County, spanning 77,000 square kilometers, limited the accessibility of remote areas during data collection. This may have introduced selection bias toward respondents in more accessible facilities. Furthermore, limited literacy among some ANC mothers required translation of questionnaires into the local Turkana dialect, which, despite care in translation, may have introduced minor semantic shifts.

Fifth, poor infrastructure and limited mobile connectivity not only represent barriers to ANC uptake but may also function as confounding variables. Respondents sampled across Turkana County's seven Sub-Counties do not share equivalent levels of infrastructural development or network connectivity, and this variability may have influenced both mobile phone engagement and ANC attendance patterns, making direct comparisons across respondents difficult.

Finally, the study relied on healthcare providers' perceptions of maternal mobile phone behavior for much of the quantitative data. While qualitative interviews with mothers provided corroborating evidence, the quantitative findings primarily reflect provider-reported observations rather than direct measurement of women's actual mobile phone usage patterns.

Conclusions

This study concludes that mobile phone accessibility significantly influenced ANC uptake in Turkana County. Most healthcare providers used mobile phones for follow-up, and pregnant women actively engaged with devices to seek ANC information. Regression analysis confirmed that accessibility had a strong effect ($\beta = 0.585$), emphasizing that device ownership and network coverage are essential prerequisites. However, access was uneven; rural and low-income women frequently relied on spouses or relatives for device use. Network disruptions and gendered access patterns remained persistent challenges. Despite these limitations, the general ownership of mobile phones provides a strong foundation for scaling mobile health interventions in the region. The study confirms that in Turkana's unique pastoralist and low-resource context, accessibility is a prerequisite for improving maternal health outcomes, but it must be supported by efforts to enhance digital literacy, address gendered barriers, and improve infrastructure.

Recommendations

Based on the study findings, several recommendations are offered across policy, infrastructure, practice, and health system domains. With regard to policy, ANC reminders should be delivered through voice calls and SMS in the Ng'aturkana language to address the literacy and language barriers documented in this study. Mobile health initiatives should be integrated into wider maternal health policies that include transport support and reliable digital infrastructure, recognizing that mobile tools function best as part of a multi-component system rather than standalone interventions.

Regarding infrastructure, policymakers should invest in expanding network coverage in the remote areas of Turkana County to ensure reliable connectivity and reduce the spatial disparities in mobile signal documented by healthcare providers. Stable electricity supply and device-charging infrastructure in health facilities and communities should also be prioritized, as these were identified as practical barriers to consistent phone use.

In terms of practice, health and community-level interventions should promote women's digital literacy through community-based initiatives, ensuring that women can use mobile devices independently rather than relying on spouses or relatives. Equally, male partners should be engaged in ANC education programs to reduce dependency and to address the gendered gatekeeping over mobile devices that was a recurring finding in both the quantitative and qualitative data.

At the health system level, healthcare providers and community health volunteers should receive comprehensive and ongoing training on the effective use of mobile tools for ANC communication. The training gaps identified in this study, where only 41% of providers reported adequate digital health training, represent a critical system-level weakness that, if addressed, would significantly enhance the reach and quality of mobile-based maternal health interventions.

Declarations

Competing Interests

The authors declare no competing interests, financial or otherwise, that could have influenced the design, conduct, reporting, or publication of this study.

Author Contributions

Maureen Awesit Etaan conceptualized the study, developed the research instruments, conducted data collection and analysis, and drafted the manuscript. Supervisory guidance and critical review of intellectual content were provided by Dr. Lucy Eunice Akinyi (Department of Teacher Education, Turkana University College) and Dr. Jeremiah Onunga (Department of Renewable Energy and Technology, Turkana University College). All authors reviewed and approved the final version of the manuscript.

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Data Availability Statement

The data supporting the findings of this study were collected through structured questionnaires and interview guides administered across public health facilities in Turkana County, Kenya, during 2025. The datasets are not publicly available due to ethical constraints and participant confidentiality agreements. Anonymized data may be made available upon reasonable request to the corresponding author, subject to the ethical approval conditions granted by the National Commission for Science, Technology, and Innovation (NACOSTI), Kenya.

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